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Title: **SE663A0: A COMMUNICATION SYSTEM FOR A VEHICLE, A DIALLING CONTROL BOARD, USE OF A DIALLING CONTROL BOARD AND METHOD FOR PROVIDING A COMMUNICATION SYSTEM FOR A VEHICLE**

Country: **SE** Sweden

Kind: **A0** Application filed

Inventor(s): **JOHAN *ULLMAN**

No Image

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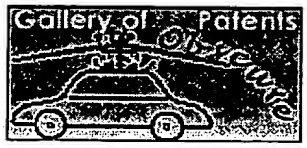

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TITLE

A communication system for a vehicle, a dialling control board, use of a dialling control board and method for providing a communication system for a vehicle.

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a communication system for a vehicle according to the preamble of claim 1, a dialling control board according to the preamble of claim 14, use of a dialling control board according to the preamble of claim 15, method for providing a communication system for a vehicle and a communication system for a vehicle according to the preamble of claim 17.

BACKGROUND OF THE INVENTION

Communication systems for vehicles are frequently used in the modern society. Most of the systems used as communication systems for vehicles use regular cellular telephones mounted in a vehicle. The cellular telephone is frequently mounted in a bracket positioned at the dashboard or in the region separating the front seats of the vehicle. The telephone is frequently removable from the bracket. When used, the user either operates the telephone by removing the telephone from the bracket, in which case the user does not have any support for the telephone whereby the handling becomes difficult, or operates the telephone at the bracket whereby the user has to operate the telephone at an inconvenient position. In the systems where the telephone is mounted in a bracket at the dashboard or centrally between the front seats of the vehicle, a driver using the telephone will have reduced attention to the traffic when changing focus from the traffic to the telephone.

In order to provide better access for a driver, it is suggested in US 4455454, US 4629828 and WO 99/30429 to arrange the keypad of the telephone at the steering wheel. By arranging the keypad at such a central position for the driver the focus of the driver could remain on the road and surrounding traffic.

While the suggested systems where the keypad of the telephone is positioned at the steering wheel provides for a safe operation of a driver, there still is a need for facilitating the use for a driver. The keypad of the telephone includes normally an array of input key switches arranged in at least three rows, where the array of the input key switches is arranged in a plane. Thus, it

is difficult for a driver to differ between the different rows of input key switches without looking at the keypad.

Furthermore, all systems described in the prior art have a keypad arranged centrally at the hub of the steering wheel. This position prevents the driver from having good support for a hand operating the telephone, since part of the hand must remain without support, or the hand must be positioned at an inclined position with extreme dorsifelxion in relation to the dialling control board.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a communication system for a vehicle including a dialling control board mounted on a steering wheel, said dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, which facilitates for a driver to use tactile information for differentiating between different rows of input key switches arranged on the steering wheel.

The object of the invention is achieved by a communication system for a vehicle according to the characterising portion of claim 1. By providing a dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows where each of said at least three rows of keys are arranged with a different angle of inclination from a plane perpendicular to a steering column when said steering wheel is mounted in a vehicle, a driver can separate the different rows from each other without looking at the dialling control board.

A second object of the invention is to provide a communication system for a vehicle including a dialling control board mounted on a steering wheel where a driver is provided adequate support for the drivers hand while operating the telephone.

This second object of the invention is achieved by a communication system for a vehicle according to the characterising portion of claim 2. By providing the dialling control board in the upper part of a hub unit constituting the central part of the steering wheel, sufficient

support for the hand of the driver is provided.

At a still more preferred embodiment of the invention, at least one of the rows constituting the array of input key switches as positioned at a top wall of the hub. By providing at least one of the rows at this position the rows are arranged in a part of the steering wheel having an arcuate shape. It is therefore possible to arrange the rows with a similar variation of inclination as the hub. Still further, by providing the different rows at different surfaces of the hub, but still in an array, it is even simpler for the driver to differ between the different rows without making it more difficult for the driver to locate the different rows of input key switches.

At a further preferred embodiment of the invention, a position mark is provided at the steering wheel at some distance from the set of input key switches. By providing a position mark at a location where the driver would naturally position a hand while operating the keypad, tactile information will be provided to the driver, thereby enabling the driver with further certainty to differ between the different rows without having to look at the keypad.

In a still further preferred embodiment of the invention the communication system includes a display unit mounted at a central position of the dashboard, whereby the driver could read a message on the display unit without substantially removing the sight from the road. This provides for better access to the system for a driver.

The invention further relates to a dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system, wherein the dialling control board is arranged in a flexible housing, and that on said flexible housing there is provided means for adhering the housing to a rigid support. By providing a flexible housing, the invention provides for the possibility to position the housing at a curved position of a steering wheel, thereby achieving the advantages of a communication system having a dialling control board including an array of input key switches including at least three rows, where each of said at least three rows has a different angle of inclination.

The invention also relates to a method of providing such a system.

The invention further relates to a communication system for a vehicle including a dialling control board mounted on a steering wheel, said dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system, wherein said steering wheel includes a hub unit and a ring shaped element connected to said hub unit via spokes. The object of the invention is, as indicated above, to provide a communication system which facilitates for a driver to use tactile information for differing between different rows of input key switches arranged on the steering wheel.

This object is solved by a communication system according to the characterising portion of claim 16. By arranging the dialling control board in the upper part of said hub unit leaving at least two thirds of the hub for giving support for a drivers hand while using the set of keys, the increased stability provides for more accurate use of tactile information when judging what row of input key switches pushed by the operator.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will in the following be further described in non-limiting way under reference to the accompanying drawings in which:

fig. 1 is a perspective view of a steering wheel, having a dialling control board mounted at an upper portion of the hub,

fig. 2 is a schematic cross section of a dialling control board including four rows of input key switches,

fig. 3 is a cross section of a flexible dialling control board,

fig. 4a-c show different embodiments of the invention positioned at different positions on the steering wheel,

fig. 5a shows a perspective view over a steering wheel having a support for a hand in the lower region of the hub, and

fig. 5b shows a cross section along the line I – I of fig. 5a of a steering wheel having a support for a hand in the lower region of the hub.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows a perspective view of a steering wheel 1 mounted at a steering column (not shown) in the front part of the interior of a vehicle. The front part of the interior of the vehicle includes a dashboard 2 having a top panel 3 and a front panel 4. Conventional instrumentation 5, such as a speed indicator and a tachometer for the engine, are arranged at the front panel 4. Fig 1 furthermore shows part of a front window 6, an A-pillar 7 supporting the window 6 and providing rigidity to the body of the vehicle and part of a door. The steering wheel includes a ring shaped element 9 connected to a hub unit 10 via spokes 11. The hub unit 10 includes a front wall 12, a top wall 13, two side walls 14, 15 and a bottom wall 16. The front wall is directed towards a driver, when seated in the vehicle. The walls 12 – 16 of the hub unit 10 cover the interior of the steering wheel 1 and a steering column arranged for supporting the steering wheel 1 and steering shaft (not shown) transmitting a rotational movement of the steering wheel to the front wheels. The front wall 12 of the hub unit 10 could optionally cover an air bag unit (not shown) mounted in the hub unit 10 of the steering wheel 1. If an air bag a mounted, a groove 17 is arranged in the front wall 12 of the hub unit 10 allowing said air bag to penetrate the front wall in case of an accident. A dialling control board 18 is arranged in the upper part of the front wall 12 of the hub unit 10. The invention provides for mounting the dialling control board 18 at a variety of different possible positions. The different possible arrangements will be described in further detail in relation to fig. 2 and figs. 4a – 4c.

The dialling control board 18 is communicating with an electronic control unit 19. In a preferred embodiment of the invention the communication between the electronic control unit 19 and the dialling control board 18 is performed via a wireless channel, for instance via radio

or optical communication. The dialling control board 18 furthermore communicates with a display unit 20. The communication between the dialling control board and the display unit is preferably wireless. The communication could be arranged directly between the display unit 20 and the dialling control board 18 or can be linked over an electronic control unit. The communication channels are symbolically indicated with the reference numerals 21 – 23.

The display unit is in a preferred embodiment arranged at a position of the dashboard 2 where the driver has only to perform a minor change of focus when altering from viewing the traffic to reading the message on the display unit. For this reason the display unit 20 is preferably arranged on the top panel 3 of the dashboard 2. In a still further preferred embodiment the display unit is positioned slightly towards the middle of the car in relation to the position of the steering wheel, that is in a plane view seen along the length axle of the vehicle, the display unit 20 should be arranged on the top panel 3 of the dashboard 2, beside, on the side towards the middle of the car, and in the vicinity of the projection of the steering wheel. The display unit is preferably arranged on a ball joint 24 allowing the display unit to be directed towards the driver, even though the driver could optionally choose different locations of a seat for convenience. Furthermore, the display unit 20 could be carrying a microphone 25, preferably a directional aerial. The display unit could also optionally be provided with a camera 26 for transmitting an image of the driver.

The electronic control unit 19 is furthermore arranged for controlling communication between the communication system provided in the vehicle and an external system. The electronic control unit could optionally be arranged in the mid console of the front panel 4 of the dashboard 2.

The dialling control board 18 includes a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows.

Fig. 2 shows a schematic cross section of a dialling control board 18 including four rows 27 – 30 of input key switches. The rows 27 –30 input key switches are arranged on the hub unit 10. In the side view part of the front wall 12 and the top wall are shown. The front wall should be understood as the area of the hub which a driver would experience as being directed towards the him or her. A possible definition of the dividing line between the front wall 12 and the top wall 13 of the upper part of the hub unit 10 a can be that the dividing line is defined as

passing through an area of the upper part the hub unit 10, where the inclination of a tangent 31 - 34, in the length direction of the vehicle, of the hub unit is at an angle of 45° in relation to a plane 35 passing through the ring shaped element 9 of the steering wheel.

As shown in fig. 2 all the different rows 27 – 30 are arranged so that the tangents 31 – 34 passing through each of the rows have different angles of inclination. The different angles of inclination could be defined in relation to any plane having a normal, which does not include a component in the direction from side to side of the vehicle. Examples of planes fulfilling the definition are a plane 35 passing through the ring shaped element 9 of the steering wheel or a plane vertical to the length direction 36 of the steering axle.

By providing a dialling control board 18 having a set of input key switches arranged in at least three rows, where said at least three rows has different angles of inclination it is possible for a driver to obtain tactile information about which row the driver is using without looking at the dialling control board.

The dialling control board 18 is arranged in the upper part of the hub unit 10.
This way of arranging the dialling control board 18 allows the driver to have support for the hand by the remaining two thirds of the hub unit. Good support for the hand improves the possibility of using tactile information about the location of the different rows and different input key switches in the rows instead of having to rely on optical information. In a preferred embodiment, the dialling control board 18 is arranged in the upper third of the hub unit, thereby increasing the security by drawing less attention from the driver.

For further improving the tactile information to the driver about the position of the hand and the position of the rows 27 – 30 of input key switches of the dialling control board 18 a position marker 37 could be arranged on the front wall 12 of the hub unit 10. The position mark is preferably arranged as a knob protruding in between 0,5 – 3 mm from the front wall 12. Alternatively the position mark could be constituted by the groove 17 facilitation the penetration of an air bag through the front wall 12.

The dialling control board is preferably arranged above said groove 17. By this position the dialling control board does not render more difficult for the airbag to penetrate the front wall.

Fig. 3 shows a dialling control board 18 including a set of at least ten input key switches 37 mounted in an array having the input key switches arranged in four rows 38 – 41. The input key switches includes the normal ten digits 0 – 9 and may also include extra functional switches such as hook off, hook on, repeat etc. all widely known in the art. The dialling control board 18 is arranged in a flexible housing 42 having a top sheet 43 and a back sheet 44. The top sheet 43 and the back sheet are 44 laminated at the periphery to form a casing. The set of input key switches is arranged on a substrate 44. Said substrate is provided with electronic components necessary for enabling the dialling control board to have its intended function. The skilled in the art is well informed about how to arrange the electronics for enabling the function as a dialling control board. The input key switches are all supported by resilient elements 45 – 48 enabling the switches to retake its position after being pushed by the operator. On the substrate 44 and surrounding the input key switches is an insulation and supporting layer 49 arranged. A second insulation layer 50 is arranged beneath the substrate 44. The top and back sheet 43 and 44, the insulation layers 49, 50 and the substrate 44 are all flexible allowing the dialling control board to be bent and mounted to an arcuate support, such as the top portion of the hub unit of a steering wheel. The thickness of the whole structure is in a preferred embodiment from 1 – 10 mm, and in a more preferred embodiment form 1 – 5 mm. Furthermore, in a preferred embodiment the back sheet 44 includes means for adhering the housing to a rigid support, which could be constituted by a layer of adhesive covered by a cover sheet.

In fig. 4a – 4c it is shown a variety of different positions of the dialling control board 18. I fig 4a two of the rows are arranged on the top wall 13, and two remaining rows are positioned on the front wall 12. In fig. 4b Two rows are positioned on the top wall 13, on is positioned on the borderline between the top wall and the front wall and one row is positioned on the front wall. In fig. 4c all the rows are positioned on the front wall. In all the embodiments shown in fig. 4a – 4c the dialling control board is positioned in the upper third of the hub unit. With upper third of the hub unit 10 is intended above the upper third of the front wall 12 or on the top wall 13 of the hub unit 10.

In fig 5a and 5b show a perspective view over a steering wheel 1.having a support 50 for a hand in the lower region of the hub 10 is shown. The support 50 is protruding from the front wall 12 of the hub 10. In a preferred embodiment the protrusion extends about 1 – 4 cm from a plane 51 defined as a tangent to a central area 52, in the height direction of the steering

wheel 1 when arranged in its normal position, of the hub in a neighbouring area of the support 50. In a preferred embodiment the support has it maximum extension in a mid-area 53 of the hub, said mid area is defined as a portion of the hub 10 positioned between the left and right edges 54, 55 of the dialling control board 18. From said mid-portion towards the edges of the hub 56, 57 the height of the support can be reduced. In a preferred embodiment the height of the support is reduced to zero a the edges 56, 57 of the hub. The support is arranged at a lower part 58 of the hub unit 10. The support should be placed so that, a person having a hand of normal length should be able to rest his or her hand on the support while using all input key switches in the different rows of the dialling control board 18.

The invention further relates to a method of providing a communication system for a vehicle including the steps of

providing a dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system, wherein said dialling control board is arranged in a flexible housing, and

providing means for adhering the housing to a steering wheel on said flexible housing.

By using this method enabling a driver to use tactile information for locating the different rows of input key switches of a dialling control board is provided.

CLAIMS

1 A communication system for a vehicle including a dialling control board (18) mounted on a steering wheel (1), said dialling control board (18) including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows (27 – 30), said set of input key switches being arranged for communicating with an electronic control unit (19) arranged for controlling communication between said communication system and an external system,
c h a r a c t e r i s e d i n that each of said at least three rows (27 – 30) of keys are arranged with a different angle of inclination from a plane (35) perpendicular to a steering axle (36) when said steering wheel is mounted in a vehicle, whereby the different angles of inclination of said at least three rows (27 – 30) of keys are arranged to provide tactile information to a driver about which row of keys the driver is using.

2 A communication system according to claim 1, wherein said steering wheel includes a hub unit (10) and a ring shaped element (9) connected to said hub unit (10) via spokes (11) c h a r a c t e r i s e d i n that said at least three rows (27 – 30) of input key switches are arranged in the upper part of said hub unit (10) leaving sufficient space at the hub unit (10) for giving support for a drivers hand while using the set of keys.

3 A communication system according to claim 2, wherein said hub unit (10) includes a front wall (12) and a top wall (13) c h a r a c t e r i s e d i n that at least one of said at least three rows (27 – 30) of input key elements are arranged on said top wall (13).

4 A communication system according to claims 2 or 3, c h a r a c t e r i s e d i n that at least one of said at least three rows (27 – 30) of input key elements are

arranged on said front wall (12).

5 A communication system according to any of the preceding claims, wherein said steering wheel (1) is provided with an airbag unit and that a groove (17) for facilitating penetration of the air bag through a wall arranged on the steering wheel (1) covering the air bag unit c h a r a c t e r i s e d i n that said dialling control board (18) is arranged above said groove (17).

6 A communication system according to any of the preceding claims, c h a r a c t e r i s e d i n that a position marker (37) is arranged on the steering wheel (1), wherein said position marker (37) is arranged for, when used by a driver, providing tactile information to the driver about the position of the drivers hand i relation to the set of input key switches.

7 A communication system according to any of the preceding claims, c h a r a c t e r i s e d i n that the communication system further includes a display unit (20) arranged on a dash board arranged in the vehicle.

8 A communication system according to claim 7, c h a r a c t e r i s e d i n that the display unit (20) carries a microphone (25).

9 A communication system according to claim 7 or 8, c h a r a c t e r i s e d i n that the display unit (20) carries a camera (26).

10 A communication system according to any of the preceding claims, c h a r a c t e r i s e d i n that said dialling control board (18) is arranged in a flexible housing (43,44), and that on said flexible housing (43,44) there is provided means for adhering the housing to the steering wheel (1).

11 A communication system according to claim 10, c h a r a c t e r i s e d i n that said flexible housing (43,44) is mounted at an arcuate part of the steering wheel (1), thereby providing different angles of inclination of said at least three rows (27 – 30) of keys.

12 A communication system according to any of the preceding claims, characterised in that a wireless communication channel (21 – 23) is provided between said dialling control board (18) and said electronic control unit (19) and/or said display unit (20).

13 A communication system according to any of the preceding claims, characterised in the steering wheel (1) is provided with a support (50) at the lower part of the hub unit (10).

14 A dialling control board (18) including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows (27-30), said set of input key switches being arranged for communicating with an electronic control unit (19) arranged for controlling communication between said communication system and an external system, characterised in that said dialling control board (18) is arranged in a flexible housing (43,44), and that on said flexible housing (43,44) there is provided means for adhering the housing to a rigid support.

15 Use of a dialling control board according to claim 14, characterised in that said flexible hosing (43,44) is mounted on a steering wheel (1) at a position where the angle of inclination at each of said at least three rows (27 –30) differ from each other.

16 Method of providing a communication system for a vehicle including the steps of

providing a dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system, wherein said dialling control board is arranged in a flexible housing, and

providing means for adhering the housing to a steering wheel on said flexible

housing.

17 A communication system for a vehicle including a dialling control board (18) mounted on a steering wheel (1), said dialling control board (18) including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows (27 – 30), said set of input key switches being arranged for communicating with an electronic control unit (19) arranged for controlling communication between said communication system and an external system, wherein said steering wheel includes a hub unit (10) and a ring shaped element (9) connected to said hub unit (10) via spokes (11) characterised in that said at least three rows (27 – 30) of input key switches are arranged in the upper part of said hub unit (10) leaving sufficient space at the hub for giving support for a drivers hand while using the set of keys.

ABSTRACT

A communication system for a vehicle including a dialling control board mounted on a steering wheel, said dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system. A dialling control board including a set of at least ten input key switches mounted in an array having the input key switches arranged in at least three rows, said set of input key switches being arranged for communicating with an electronic control unit arranged for controlling communication between said communication system and an external system.

Fig.1

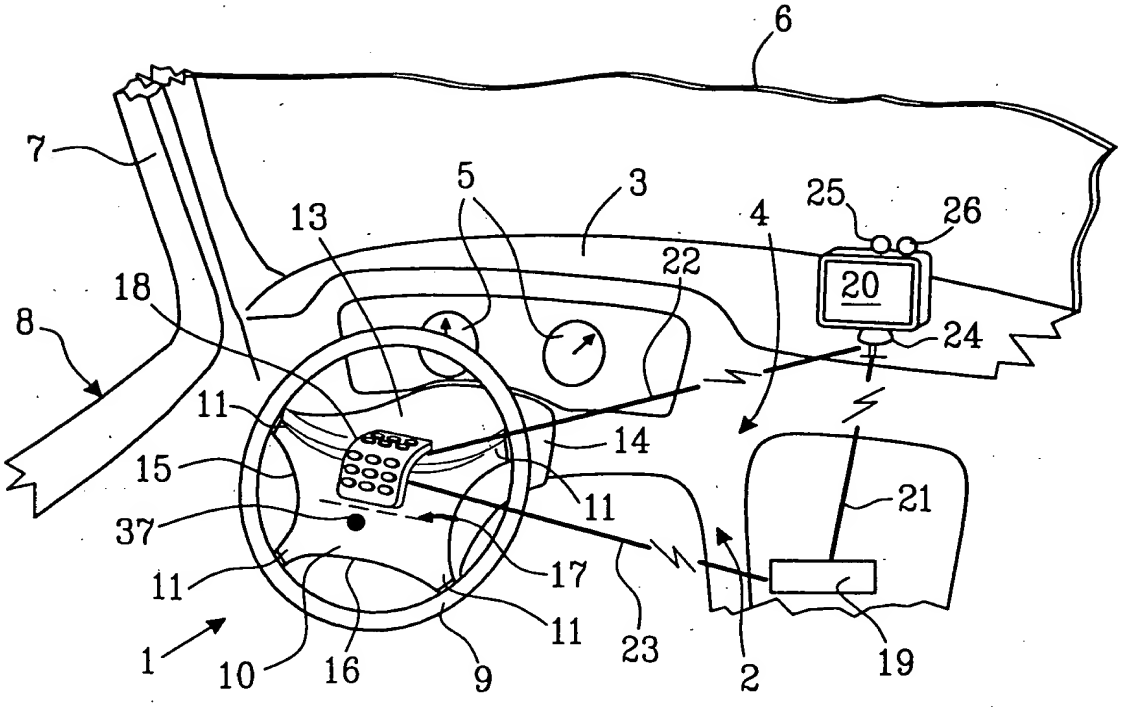
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FIG.1

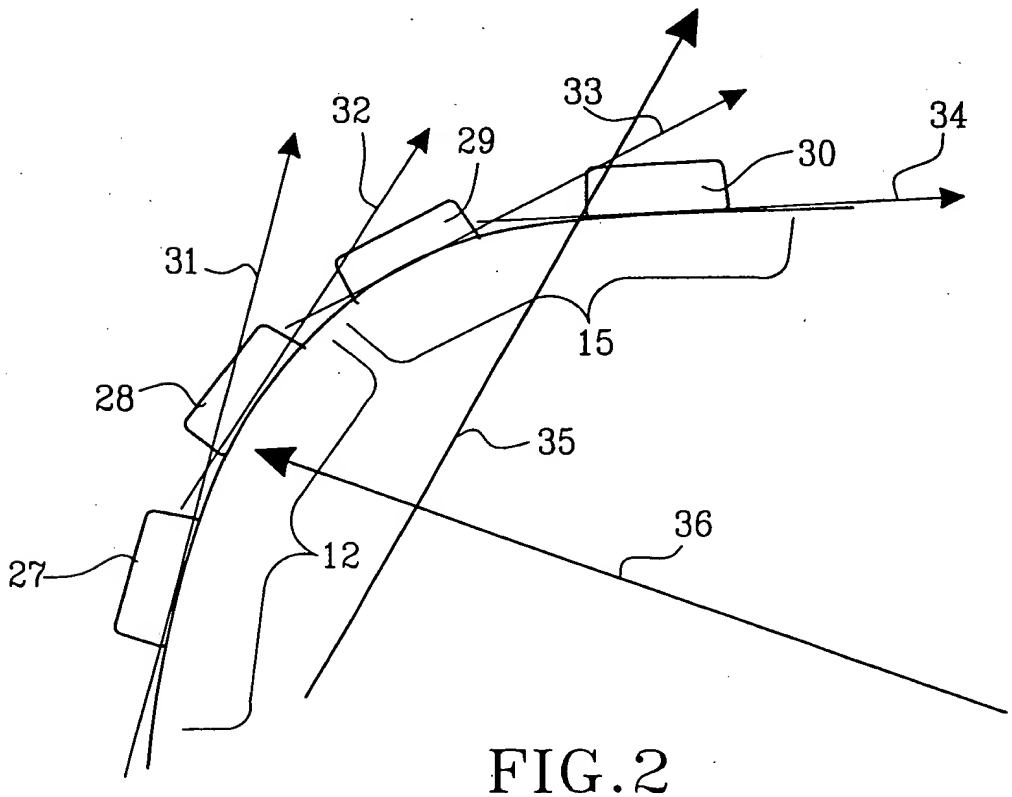
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FIG.2

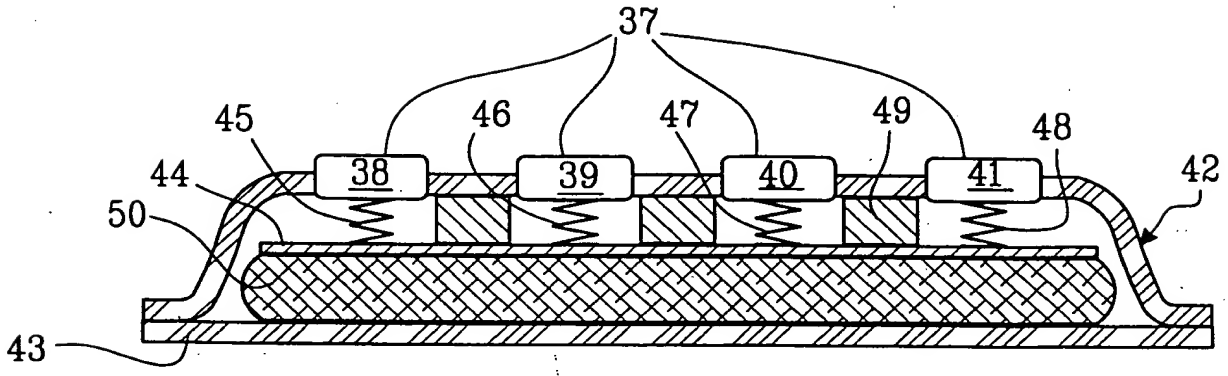

FIG.3

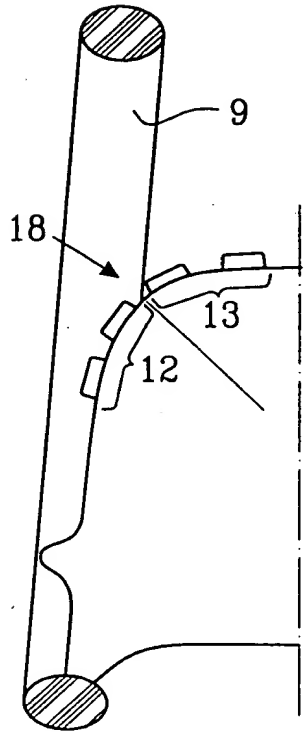

FIG.4a

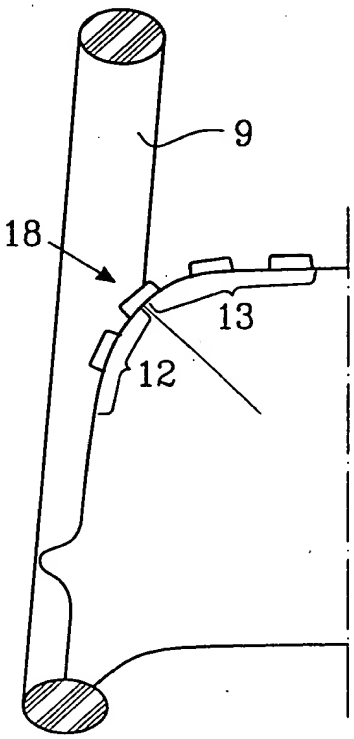

FIG.4b

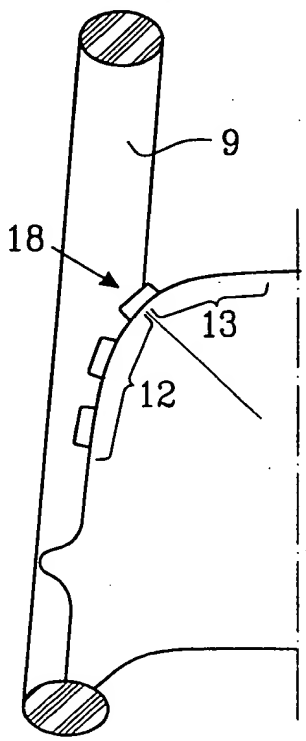

FIG.4c

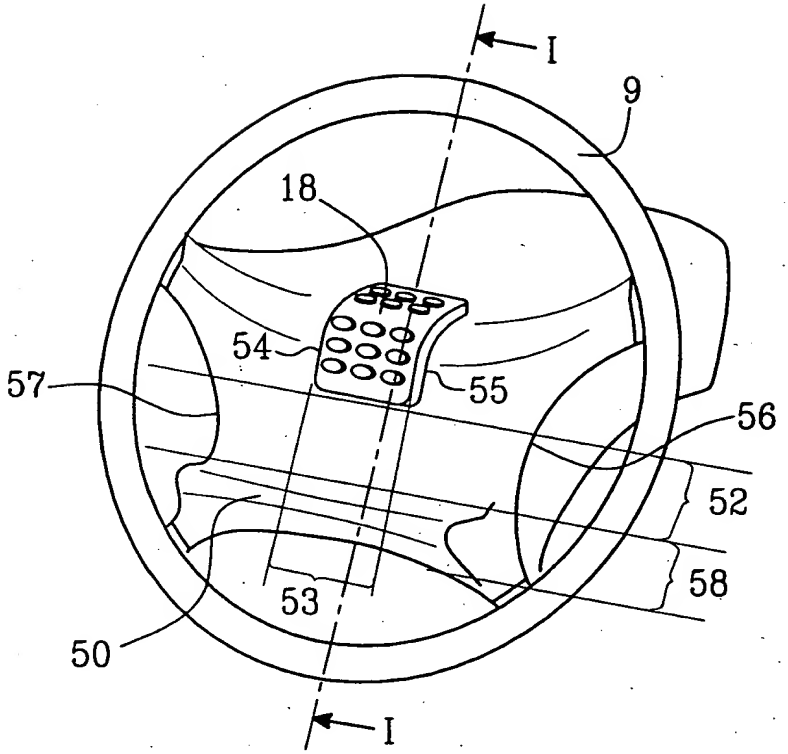

FIG.5a

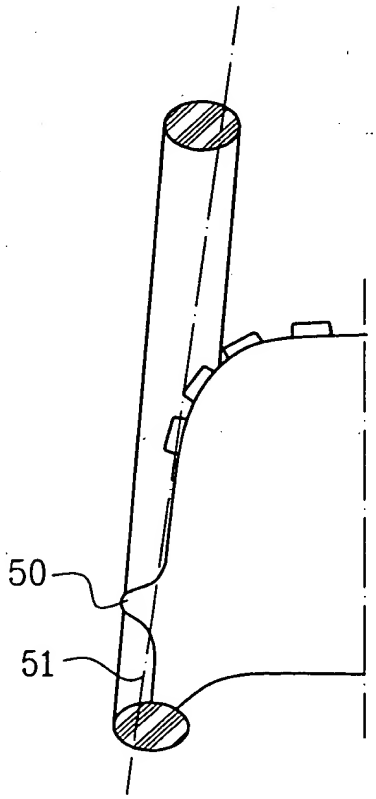

FIG.5B